# Computerized Provider Order Entry: Lessons Learned from the Trenches

July 10, 2007


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# The Unintended Consequences of Computerized Provider Order Entry

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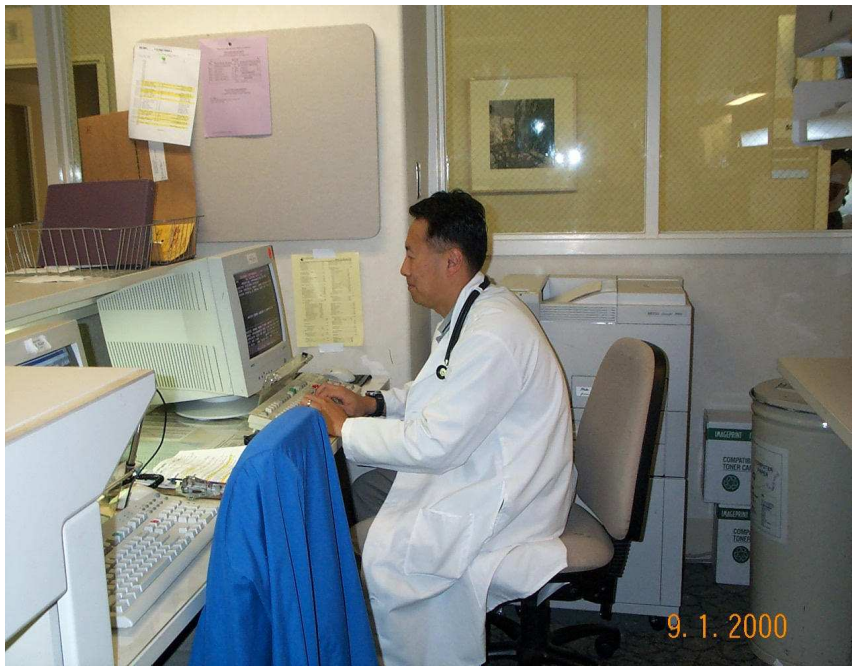
With Dean F. Sittig, Ph.D., Richard H. Dykstra, M.D., M.S., Emily M. Campbell, R.N., M.S., Ken P. Guappone, M.D., and James Carpenter, R.Ph., M.S.

This work was supported by grant LM006942 from the U.S. National Library of Medicine, National Institutes of Health

# What is computerized provider order entry (CPOE)?

- Process which allows an authorized provider to use a computer to directly enter medical orders
- Usually part of a suite of clinical applications

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# CPOE implementation has its upsides and downsides

Outline

- Background
- Methods
- Results
  - Unintended consequences types
  - Survey
- Recommendations

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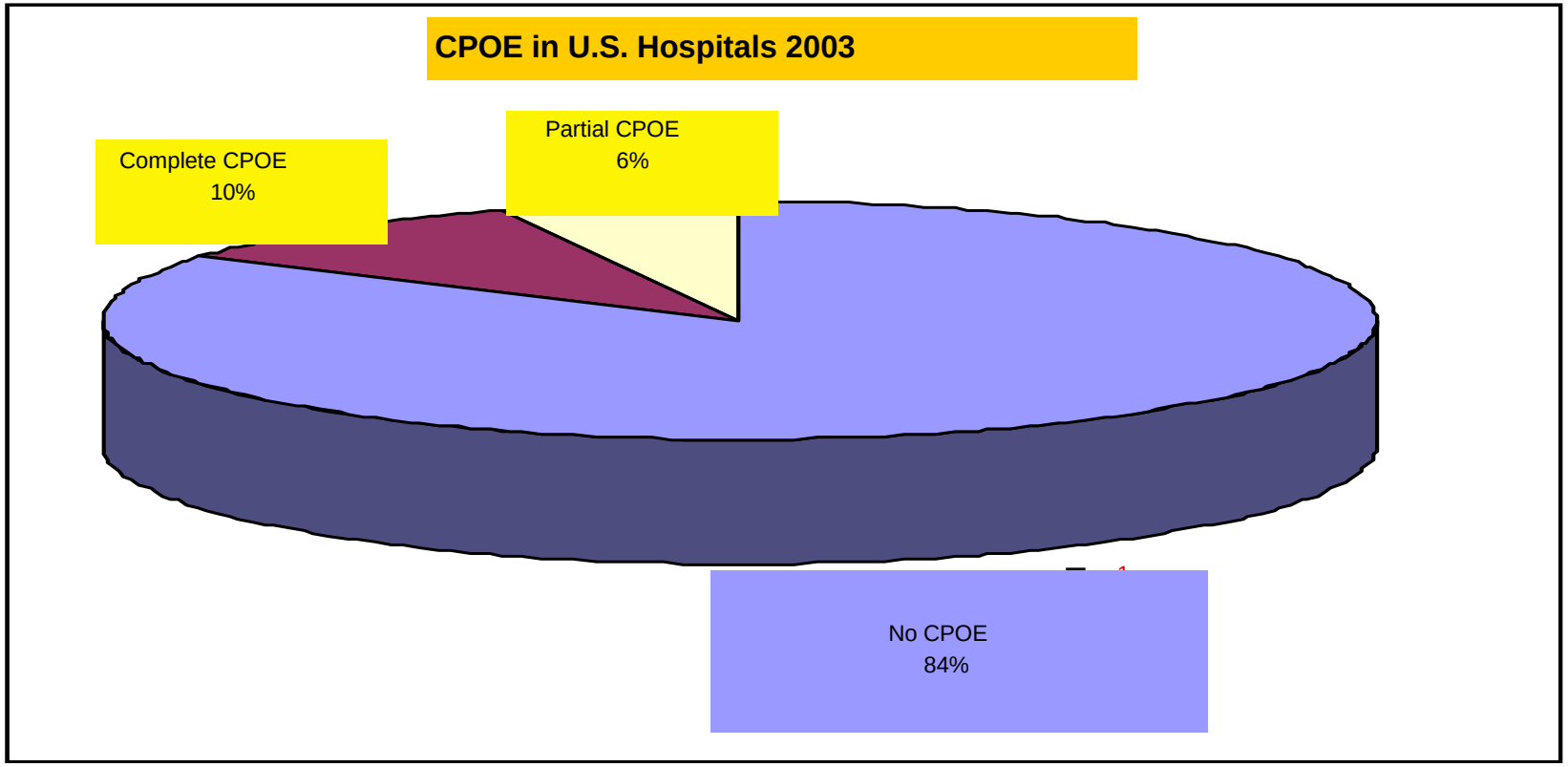
# Our two surveys* and those of others have shown that adoption of CPOE is low

*Ash JS, Gorman PG, Hersh WR. Physician order entry in U.S Hospitals. Proceedings AMIA 1998:235-239.
Ash JS, Gorman PN, Seshadri V, Hersh WR. Computerized physician order entry in U.S. hospitals: Results of a 2002 survey. Journal of the American Medical Informatics Association 2004; 11(2):95-99.

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# We turned to qualitative methods

- To find out why CPOE has not diffused
- To identify success factors for implementing computerized physician order entry
- To describe unintended consequences

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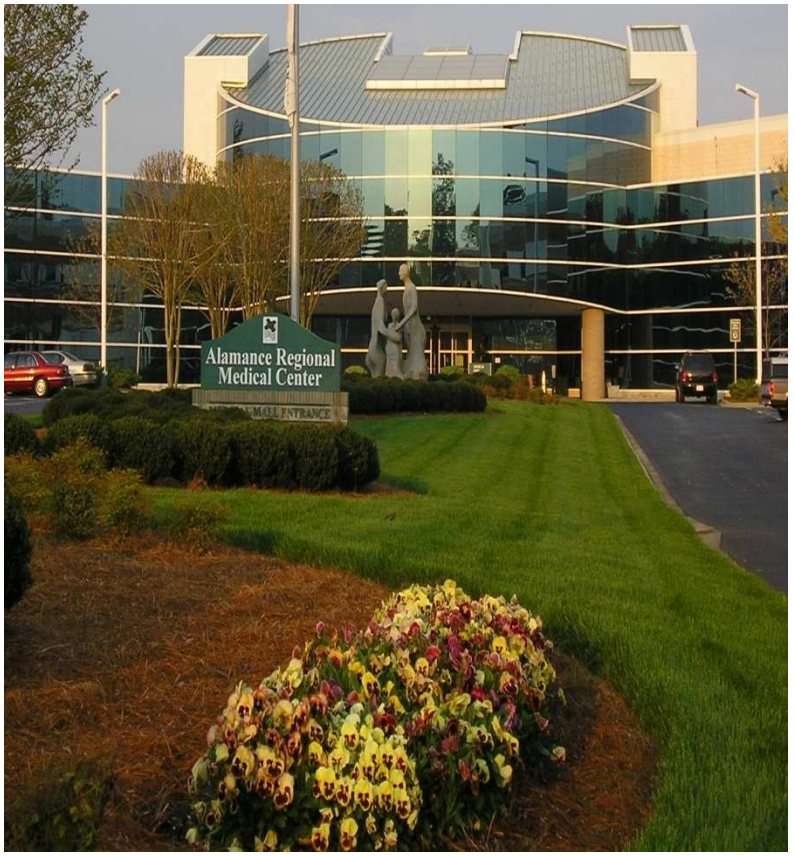
# We did fieldwork over a six year period

- Five sites for success factors study
  - Two VA, El Camino, U Va, Kaiser NW
- Five hospitals for unintended consequences study
  - Wishard, BWH, MGH, Faulkner, Alamance

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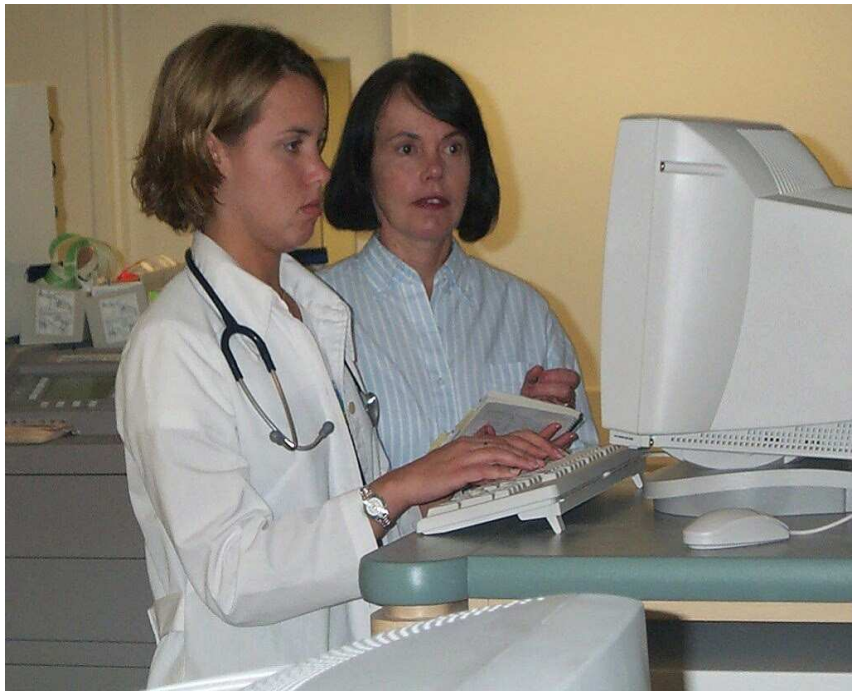
# We used multiple researchers, methods, sites, and types of subjects to assure trustworthiness

- Observation: 784 person-hours
- Interviews, focus groups: 87
- Over 2000 pages of data



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# We met to conduct team analysis

- 2,173 pages of data
- 86 analysis meetings
- Agreement on patterns and themes
- Found 380 unintended consequences

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# We discovered what “unintended” means

- Unanticipated and not specifically a goal of the project
- “Unintended” most often connotes consequences that are unanticipated and undesirable
- They are not uniformly errors or mistakes:  they are simply surprises


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# We identified types of unintended adverse consequences*

- More/new work for clinicians
- Workflow issues
- Never ending system demands
- Paper persistence
- Changes in communication patterns
- Emotions
- New kinds of errors
- Changes in the power structure
- Overdependence on the technology

*Campbell E, Sittig DF, Ash JS, Guappone K, Dykstra R. Types of unintended consequences related to computerized provider order entry. Journal of the American Medical Informatics Association 2006; 13(5):547-556.

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# We developed a telephone survey

- Five questions about hospital use of CPOE to measure “infusion,” or sophistication
- Eight questions about unintended consequences (UCs)
- For each type of UC we asked (neutrally) if they experienced it and how important it is

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# We surveyed all U.S. hospitals with CPOE

- HIMSS Analytics database identified 448 hospitals as “having implemented CPOE” from over 4500 hospitals
- Added all 113 Veterans’ Affairs (VA) hospitals to this list
- Attempted to contact all 561 hospitals

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# We successfully interviewed 176 hospital representatives*

- Conducted telephone interviews with staff at 299 of the 561 acute care hospitals
- Discovered that 89 listed as having CPOE did not
- 34 hospitals had policies against doing surveys
- Response rate (based on 176 valid interviews) was 47%

*Ash JS, Sittig DF, Poon EG, Guappone K, Campbell E, Dykstra RH. The extent and importance of unintended consequences related to computerized provider order entry. Journal of the American Medical Informatics Association (in press).

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# We found that CPOE is heavily infused*

*Sittig DF, Guappone K, Campbell E, Dykstra RH, Ash JS. A survey of U.S.A. acute care hospitals' computer-based provider order entry system infusion levels. Proceedings MedInfo 2007; in press.

- Length of time that CPOE had been in place ranged from
  - 6 months to 25 years (median = 5 years)
- % of orders entered electronically ranged from
  - 1-100% (median = 90.5%)
- Greater than 96% of the sites used CPOE to enter pharmacy, laboratory and imaging orders
- 82% were able to access all aspects of the clinical information system with a single sign-on
- 86% of the respondents had at least 3 types of decision support (order sets, drug-drug interaction warnings, and pop-up alerts)
- 90% had a CPOE committee in place

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# We also found that most hospitals had experienced unintended consequences

- At least 72% of respondents ranked more work/new work, workflow, system demands, communication, emotions, and dependence on the technology as moderately to very important.
- Shifts in the power structure and CPOE as a new source of errors ranked lower.

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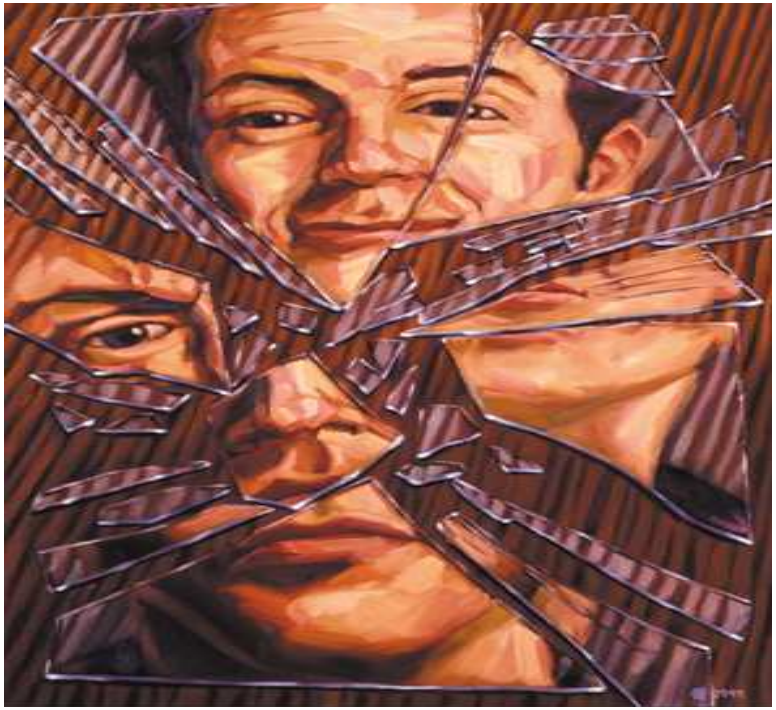
# We discovered there are “two sided” consequences

- Sometimes positive and sometimes negative
- “I am glad the computer goes down sometimes. Otherwise, I will forget how to use it [paper]”



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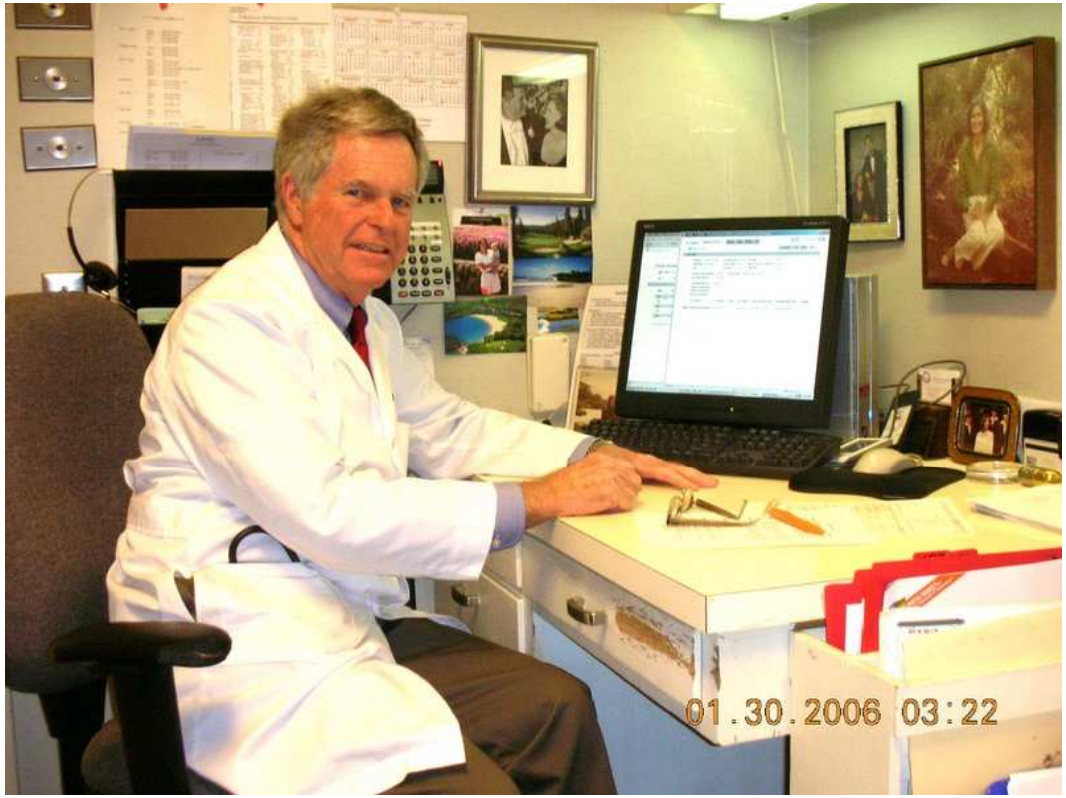
# CPOE creates new work for clinicians and changes their workflow




- Enter new data; re-entry of data; no double checks
- Respond to alerts
- Expend extra time in completing non-routine, complex orders

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# The scale for scoring ranged from 0 to 5

- 0 = UC does not exist here
- 1 = not at all important
- 2 = a little important
- 3 = moderately important
- 4 = important
- 5 = very important

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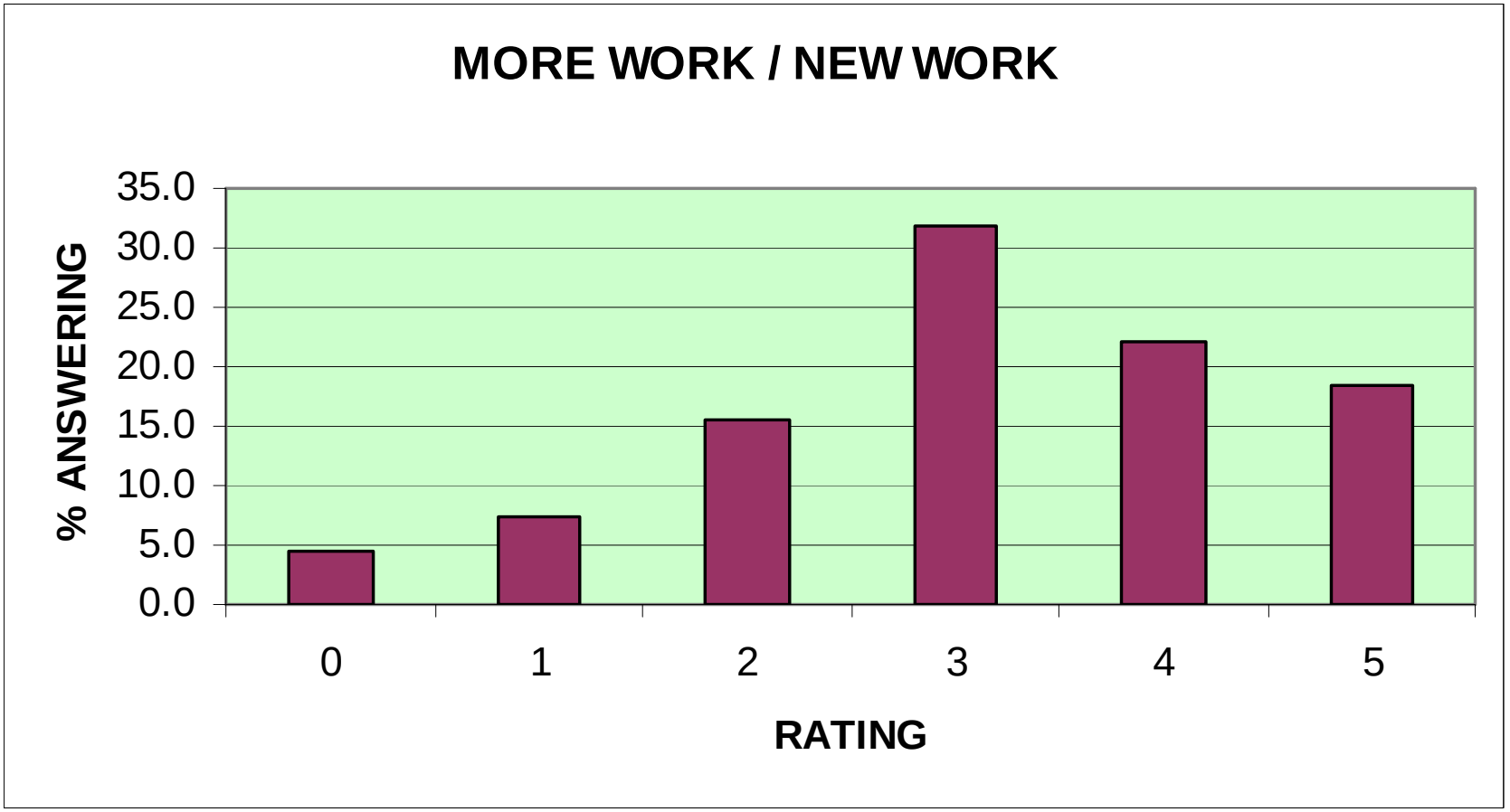


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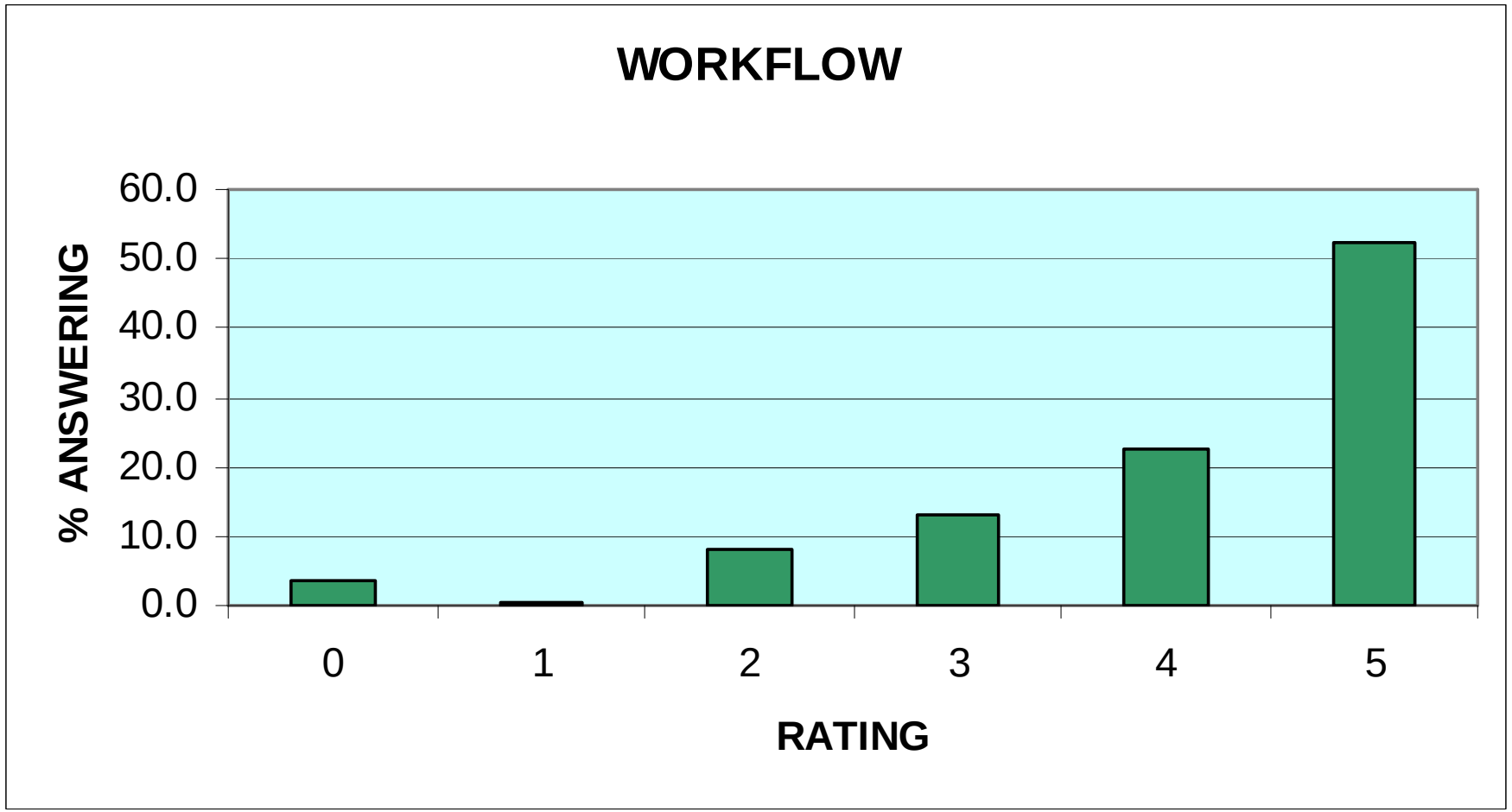


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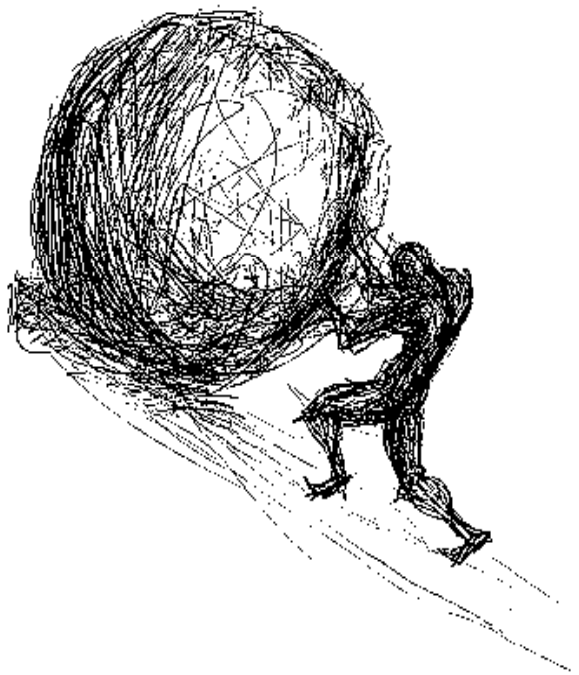
# CPOE causes never ending system demands for the information technology organization

- Demand for hardware & software purchase, implementation, and maintenance
- Personal order sets are difficult to standardize, update, or maintain over time
- Users demand more sophisticated functionality



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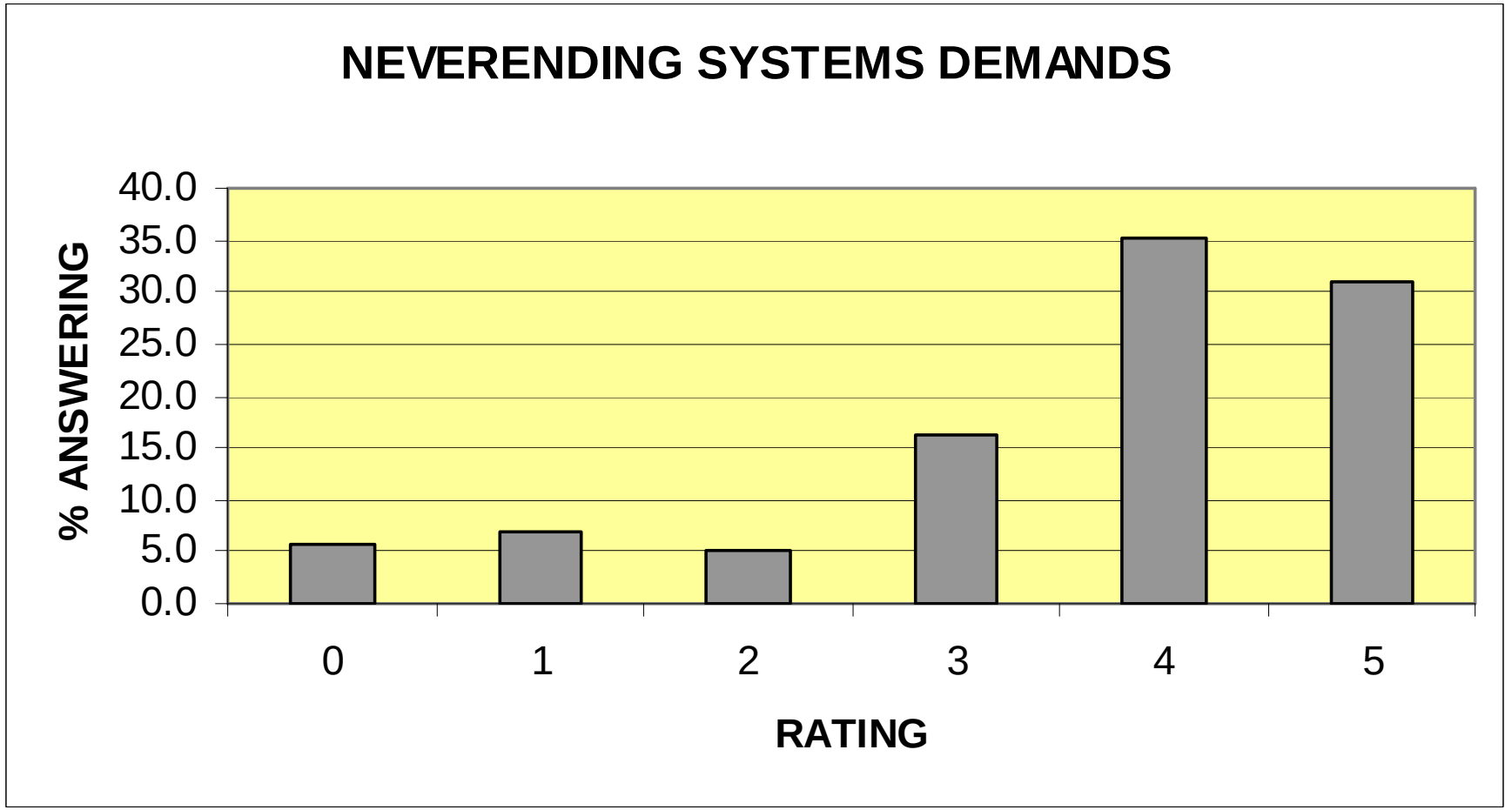


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# CPOE alters communication among providers, ancillary services, and clinical departments*

- Causes reductions in face-to-face communication
- Causes “illusion of communication” belief that the proper people will see it and act upon it
- Causes depersonalization

*Dykstra R. Computerized physician order entry and communication: Reciprocal impacts. Proceedings AMIA 2002:230-4.

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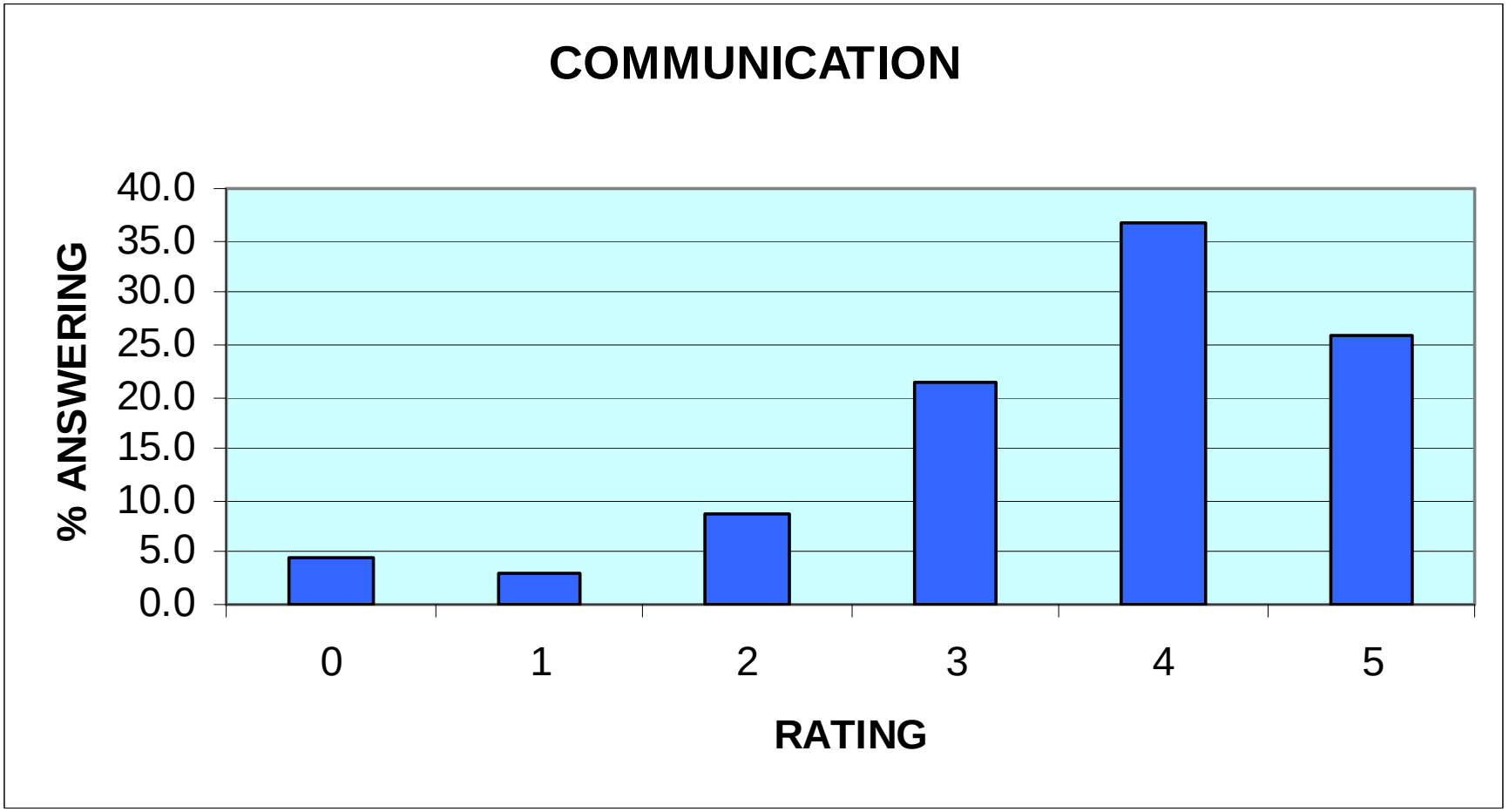


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# Emotions run high*

- CPOE evokes
  strong emotional responses
  - strongly negative
  - highly positive emotions
- Strong positive correlation between
  time system is in place and
  positive emotions

*Sittig DF, Krall M, Kaalaas-Sittig J, Ash JS. Emotional aspects of computer-based provider order entry: A qualitative study. Journal of the American Medical Informatics Association 2005; 12(5):561-7.

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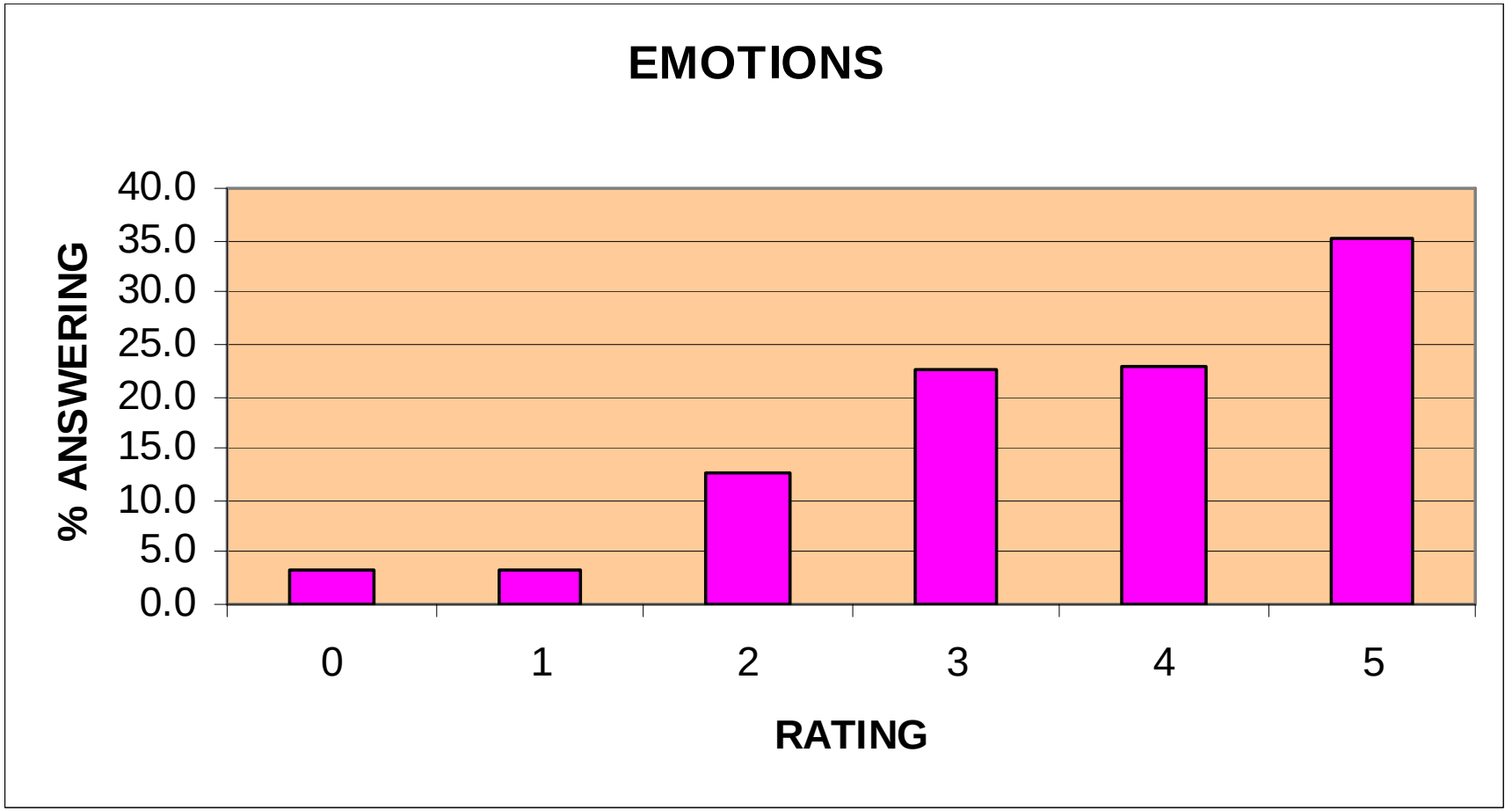


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# CPOE can quietly cause new kinds of errors

Pick lists for data entry promote juxtaposition errors

- *"I ordered the test that was right next to the one I thought I ordered, you know, right below it. My little thingie had come down and I clicked and I'm lookin' at this one but in fact I clicked on the thing before. By that time I turned my head and I'm hitting return and typing my signature and not seeing it"*

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# CPOE causes changes in the power structure*

- Loss of clinician autonomy
- Administration and I.T. gain power
- Clinical decision support can "tell doctors how to practice"
- Coalitions

*Ash JS, Sittig DF, Campbell E, Guappone K, Dykstra R. An unintended consequence of CPOE implementation: Shifts in power, control, and autonomy. Proceedings AMIA 2006:11-15.

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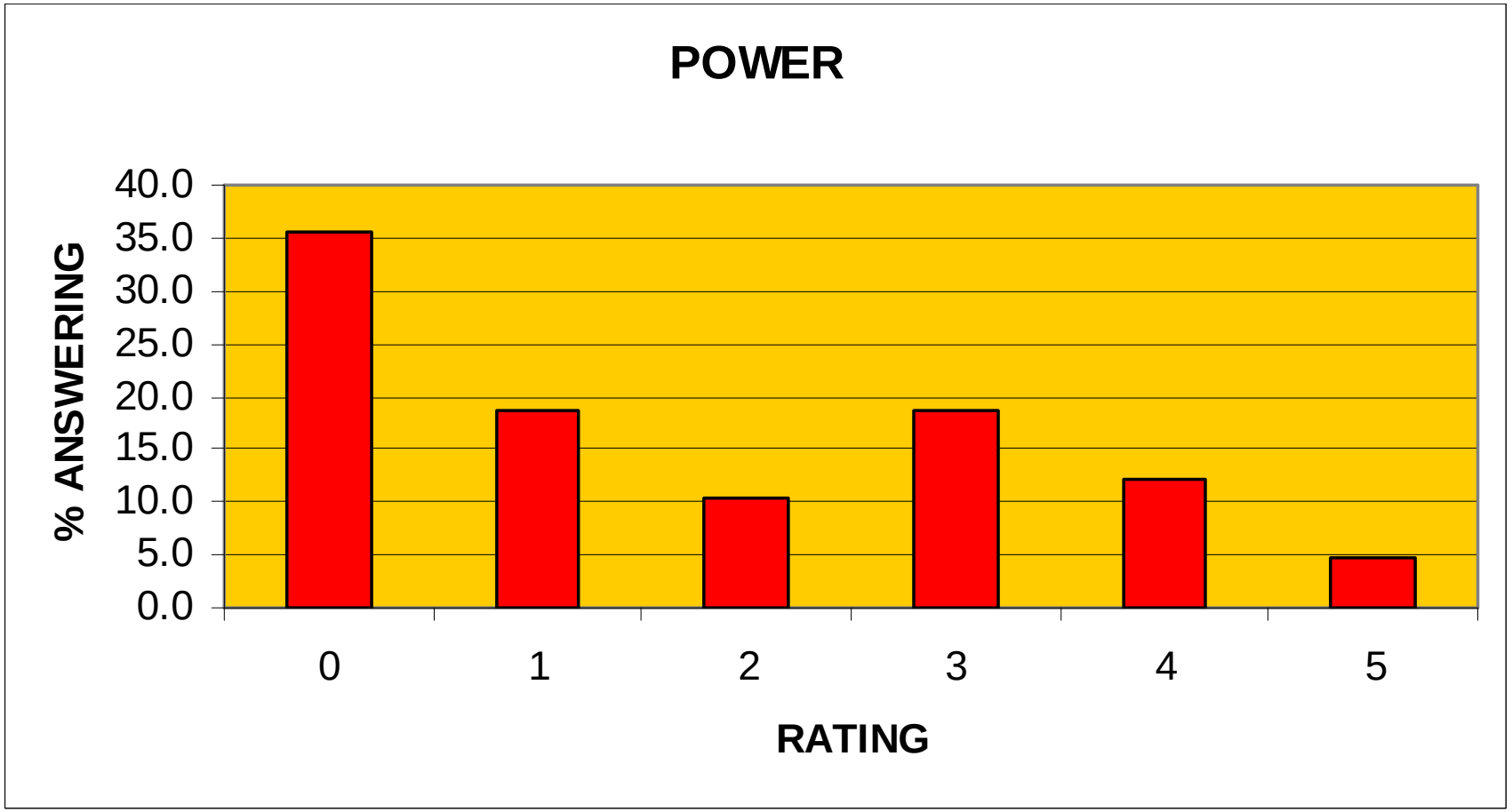


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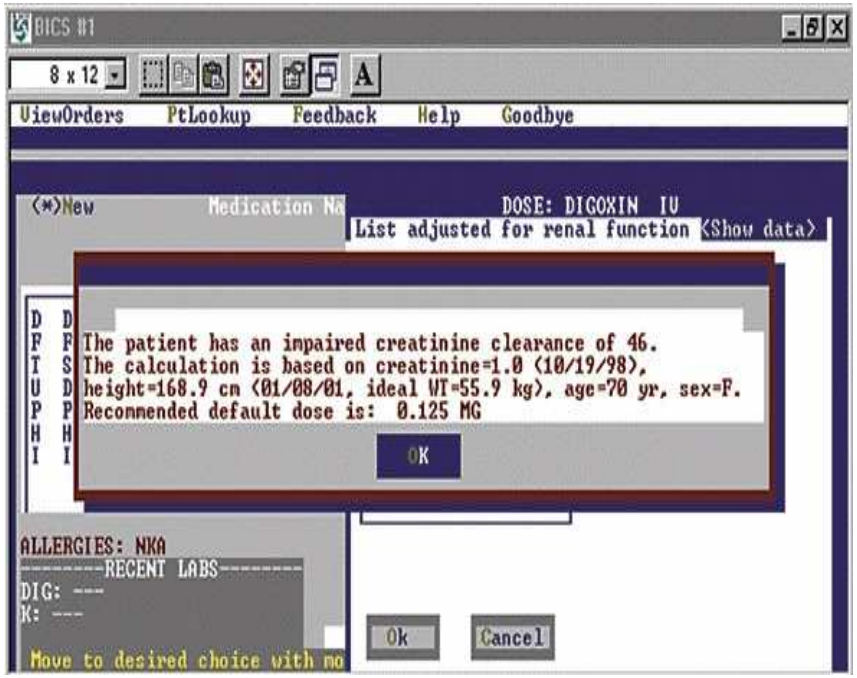
# Clinical care becomes over dependent on the computing infrastructure





The cockpit of a Boeing 737-700.

- System failures wreak havoc unless good downtime procedures exist
- Reliance on clinical decision support may reduce learning
- *"If it's in the computer it must be right!"*

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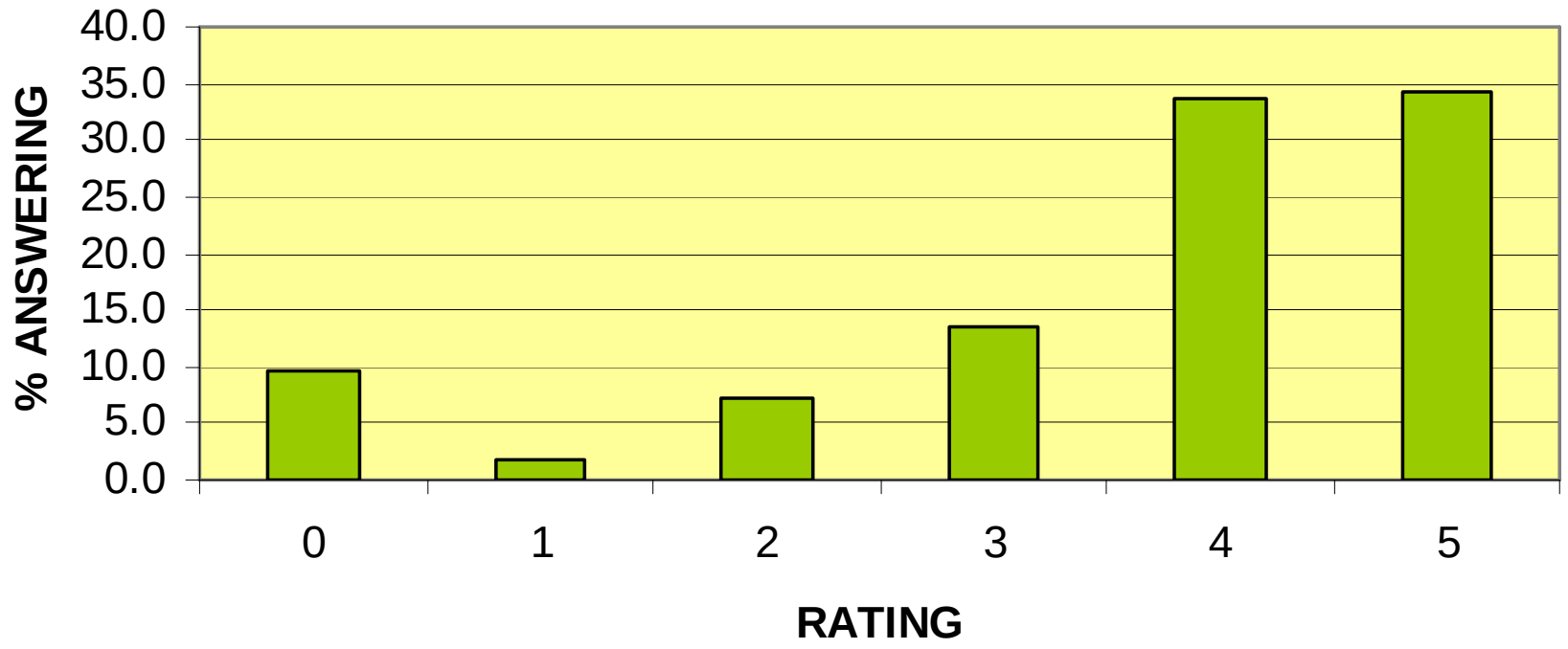
# OVERDEPENDENCE ON TECHNOLOGY

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How can we prevent, manage, or overcome these unintended consequences?

# Pay attention to time issues

- Speed of order entry
- Speed of full order process
- Life cycle of implementation
- Address workflow and emotions

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# Consider multidimensional integration

- Systems integration
- Integration into workflow
- Fit with integrated health care delivery system
- The hub concept
- These address workflow, communication, more work, and emotions

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# Management of all unintended consequences categories is related to adequate financial resources

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# Pay attention to meeting information needs

- Technical aspects: quality of application, customizability
  - Entering dot in required field
- These address workflow, power, communication, emotions

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# Consider value to users and tradeoffs

- Value:  remote entry, legibility, decision support
- Tradeoffs: time, rigidity, adapting to upgrades
- These address workflow, power, communication, more work, overdependence, emotions

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# Management is related to the existence of special people*

- Administrative leaders
- Clinical leaders, champions, curmudgeons
- Bridgers / support staff, help at the elbow
- Training
- Vendor
- These address all of the types of unintended consequences

*Ash JS, Stavri PZ, Dykstra R, Fournier L. Implementing computerized physician orderentry: The importance of special people. International Journal of Medical Informatics 2003;69:235-250.

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# Consider organizational culture

- Organizational culture
  - Administrative commitment, vision
  - Trust
- Leadership open to feedback, collaboration
- Collaborative project management
- These can address all types of unintended consequences

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# Management is related to continuous improvement through evaluation and learning

- Careful planned evaluation
- Continuous modification
- Involvement and feedback
- Address all types of unintended consequences

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# Our conclusion is that it is possible to handle many unintended consequences

- The goal is to learn more about them
- To better understand them
- To realize how complex CPOE is

www.cpoe.org

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# CPOE

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Chief Nursing Officer
Huron Hospital – a Cleveland Clinic hospital

July 10, 2007

# Huron Hospital

- A Cleveland Clinic hospital
- Located in East Cleveland, Ohio
- 211 bed teaching facility
- Level II Trauma Center

# AHRQ Grant

- Project Title: CCHS-East Huron Hospital CPOE Project
- Project Period: 9/30/2004 – 8/31/2007
- Grant Number: 5 UC1 HS015076

Huron Hospital

# Percentage of Direct Order Entry in EMR (AKA - Adoption Rate)

Type of Order Entry: Includes New , Modified , Discontinued and Discontinue/Reorder Order Entry
Ordering Personnel: Includes Physicians, Residents, Certified Nurse Midwife, and Nurse Practitioners
Order Source: Includes Direct Order Entry, Verbal / Phone, Verbal / Phone on Order Sheet, and Written

Selection Criteria: Order Creation From Date: 6/1/2006 12:00:00AM
Order Creation To Date: 6/2/2007 12:00:00AM

| | RESIDENTS | | | | | TOTAL ORDER ENTRY (ALL CLINICIANS) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Month | Direct Order Entry | Verbal / Phone | Written | Total | % Direct Order | Direct Order Entry | Verbal / Phone | Written | Total | % Direct Order Entry |
| June | 47190 | 3006 | 404 | 50600 | 93.26% | 55963 | 11043 | 6487 | 73493 | 76.15 % |
| July | 46809 | 3111 | 288 | 50208 | 93.23% | 58004 | 11438 | 6279 | 75721 | 76.60 % |
| August | 54521 | 3447 | 392 | 58360 | 93.42% | 63980 | 12420 | 7201 | 83601 | 76.53 % |
| September | 46535 | 3319 | 211 | 50065 | 92.95% | 56150 | 12311 | 6873 | 75334 | 74.53 % |
| October | 46072 | 3892 | 450 | 50414 | 91.39% | 56610 | 12199 | 7950 | 76759 | 73.75 % |
| November | 46342 | 3482 | 441 | 50265 | 92.20% | 56685 | 11776 | 7705 | 76166 | 74.42 % |
| December | 48556 | 3292 | 759 | 52607 | 92.30% | 57111 | 11180 | 7868 | 76159 | 74.99 % |
| | | | | | | | | | | |
| 2006 YTD | 336,025 | 23,549 | 2,945 | 362,519 | 92.69 % | 404,503 | 82,367 | 50,363 | 537,233 | 75.29 % |
| | 92.69% | 6.50 % | 0.81 % | | | 75.29 % | 15.33 % | 9.37 % | | |
| January | 54105 | 3484 | 412 | 58001 | 93.28% | 61906 | 12526 | 8206 | 82638 | 74.91 % |
| February | 46140 | 2905 | 299 | 49344 | 93.51% | 53614 | 10207 | 6383 | 70204 | 76.37 % |
| March | 53824 | 2962 | 288 | 57074 | 94.31% | 62652 | 11546 | 7972 | 82170 | 76.25 % |
| April | 45313 | 2479 | 810 | 48602 | 93.23% | 52494 | 10504 | 7720 | 70718 | 74.23 % |
| May | 48274 | 2781 | 211 | 51266 | 94.16% | 55758 | 11194 | 7311 | 74263 | 75.08 % |
| June | 1502 | 67 | 7 | 1576 | 95.30% | 1835 | 327 | 171 | 2333 | 78.65 % |
| | | | | | | | | | | |
| 2007 YTD | 249,158 | 14,678 | 2,027 | 265,863 | 93.72 % | 288,259 | 56,304 | 37,763 | 382,326 | 75.40 % |
| | 93.72 % | 5.52 % | 0.76 % | | | 75.40 % | 14.73 % | 9.88 % | | |

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a Cleveland Clinic hospital

Presented by: Barbara Moran
R.N., B.S.N., M.B.A.
Cleveland Clinic Health System



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# Current Status

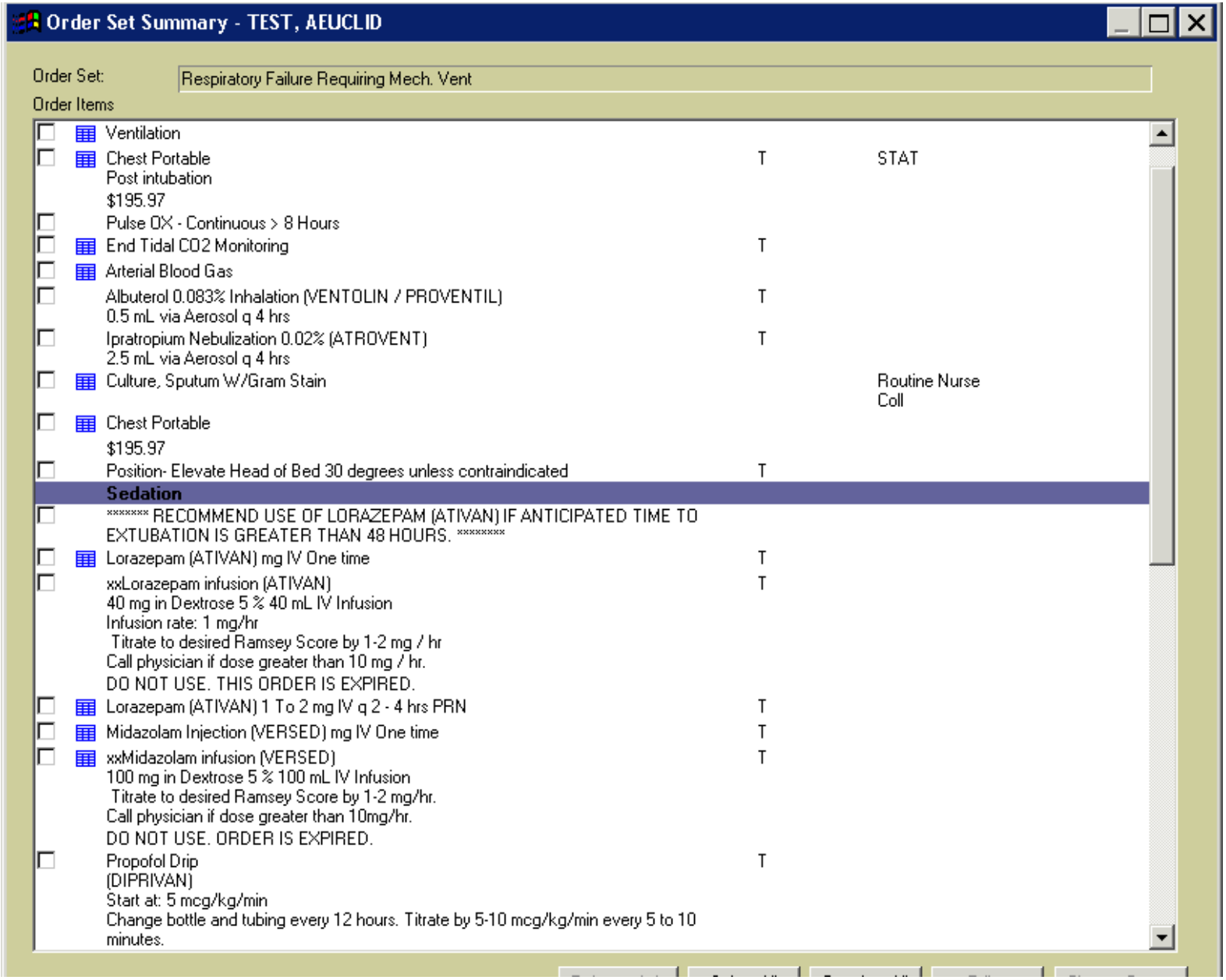
- Project continues with targeted improvements via customization (discharge instruction sheet, force functions)
- Entire health system moving to a single vendor (10 hospitals plus multiple health centers)

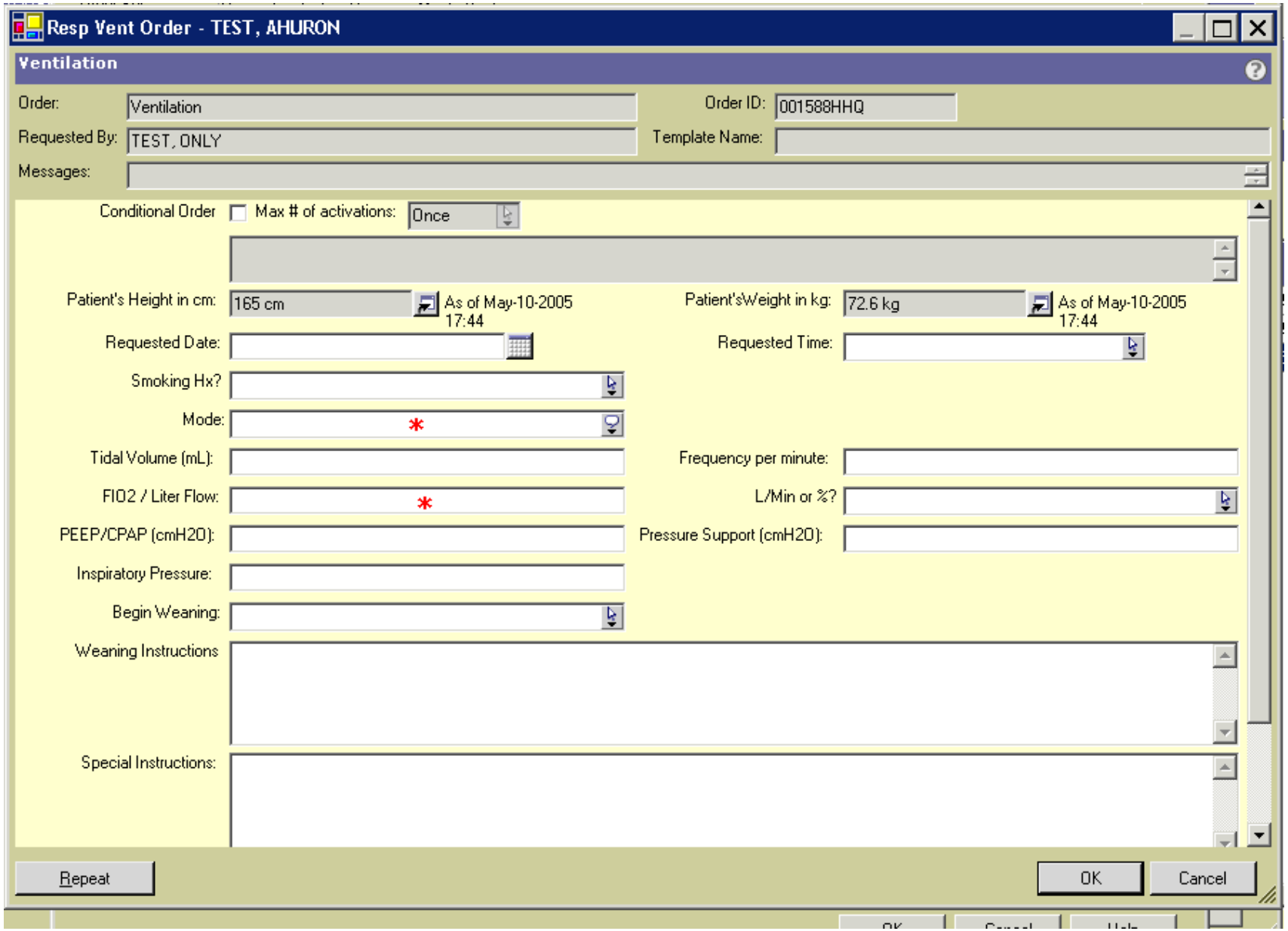
# Unintended Consequences

- Computer literacy
  - Training sessions needed for physicians and staff who had limited computer skills
  - Private training sessions for physicians in 30 minute time increments
  - Group classes for other staff
- Downtime recovery procedures prolonged
  - All orders must be entered into EMR (not just lab, rad and meds)
  - Very time consuming if prolonged downtime
  - Entry duties divided amongst staff

# Unintended Consequences

- Physician time commitment prolonged
  - Physicians viewed order entry as clerical work that was too time consuming
    - Advantages stressed – less phone calls for legibility, clarification, and drug interactions, much faster order to action time
    - Convenience order sets developed
    - Physician Liaison is a permanent position
  - Patients were hard to locate
    - Patient lists refined
  - Individual patient information took too long to collate
    - Clinical Summary Screen


Order Set Summary - TEST, AEUCLID
Order Set:
Respiratory Failure Requiring Mech. Vent
Order Items
Ventilation
Chest Portable
Post intubation
$195.97
T
STAT
Pulse OX - Continuous > 8 Hours
End Tidal CO2 Monitoring
T
Arterial Blood Gas
Albuterol 0.083% Inhalation (VENTOLIN / PROVENTIL)
0.5 mL via Aerosol q 4 hrs
T
Ipratropium Nebulization 0.02% (ATROVENT)
2.5 mL via Aerosol q 4 hrs
T
Culture, Sputum W/Gram Stain
Routine Nurse Coll
Chest Portable
$195.97
Position- Elevate Head of Bed 30 degrees unless contraindicated
T
Sedation
******* RECOMMEND USE OF LORAZEPAM (ATIVAN) IF ANTICIPATED TIME TO EXTUBATION IS GREATER THAN 48 HOURS. ********
Lorazepam (ATIVAN) mg IV One time
T
xxLorazepam infusion (ATIVAN)
40 mg in Dextrose 5 % 40 mL IV Infusion
Infusion rate: 1 mg/hr
Titrate to desired Ramsey Score by 1-2 mg / hr
Call physician if dose greater than 10 mg / hr.
DO NOT USE. THIS ORDER IS EXPIRED.
T
Lorazepam (ATIVAN) 1 To 2 mg IV q 2 - 4 hrs PRN
T
Midazolam Injection (VERSED) mg IV One time
T
xxMidazolam infusion (VERSED)
100 mg in Dextrose 5 % 100 mL IV Infusion
Titrate to desired Ramsey Score by 1-2 mg/hr.
Call physician if dose greater than 10mg/hr.
DO NOT USE. ORDER IS EXPIRED.
T
Propofol Drip
(DIPRIVAN)
Start at: 5 mcg/kg/min
Change bottle and tubing every 12 hours. Titrate by 5-10 mcg/kg/min every 5 to 10 minutes.
T

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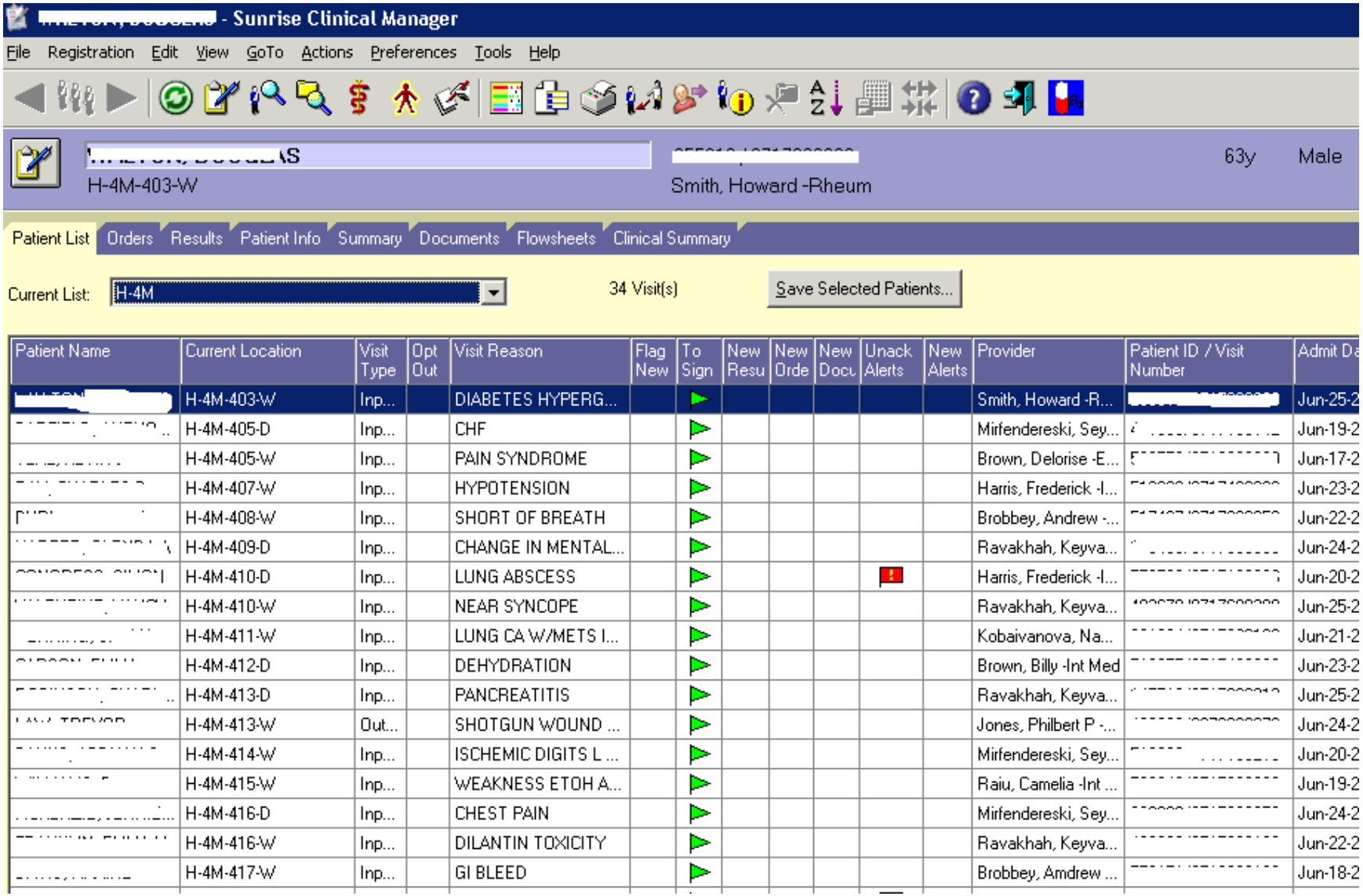
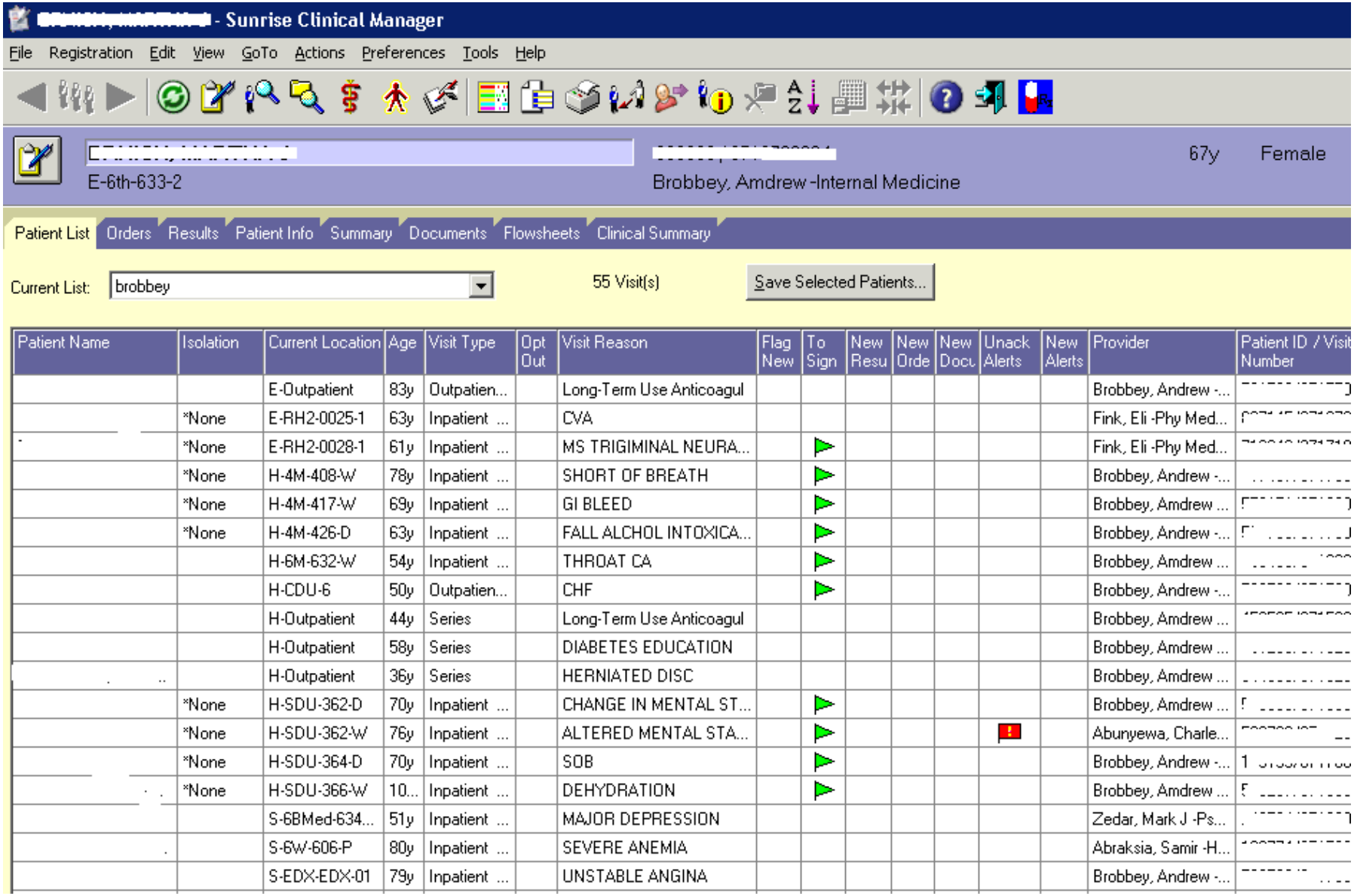

- Sunrise Clinical Manager
File Registration Edit View GoTo Actions Preferences Tools Help
H-4M-403-W
Smith, Howard -Rheum
63y Male
Patient List Orders Results Patient Info Summary Documents Flowsheets Clinical Summary
Current List: H-4M
34 Visit(s)
Save Selected Patients...
Patient Name | Current Location | Visit Type | Opt Out | Visit Reason | Flag New | To Sign | New Resu | New Orde | New Docu | Unack Alerts | New Alerts | Provider | Patient ID / Visit Number | Admit Da
H-4M-403-W | Inp... | DIABETES HYPERG... | Smith, Howard -R... | Jun-25-2
H-4M-405-D | Inp... | CHF | Mirfendereski, Sey... | Jun-19-2
H-4M-405-W | Inp... | PAIN SYNDROME | Brown, Delorise -E... | Jun-17-2
H-4M-407-W | Inp... | HYPOTENSION | Harris, Frederick -I... | Jun-23-2
H-4M-408-W | Inp... | SHORT OF BREATH | Brobbey, Andrew -... | Jun-22-2
H-4M-409-D | Inp... | CHANGE IN MENTAL... | Ravakhah, Keyva... | Jun-24-2
H-4M-410-D | Inp... | LUNG ABSCESS | Harris, Frederick -I... | Jun-20-2
H-4M-410-W | Inp... | NEAR SYNCOPE | Ravakhah, Keyva... | Jun-25-2
H-4M-411-W | Inp... | LUNG CA W/METS I... | Kobaivanova, Na... | Jun-21-2
H-4M-412-D | Inp... | DEHYDRATION | Brown, Billy -Int Med | Jun-23-2
H-4M-413-D | Inp... | PANCREATITIS | Ravakhah, Keyva... | Jun-25-2
H-4M-413-W | Out... | SHOTGUN WOUND ... | Jones, Philbert P -... | Jun-24-2
H-4M-414-W | Inp... | ISCHEMIC DIGITS L ... | Mirfendereski, Sey... | Jun-20-2
H-4M-415-W | Inp... | WEAKNESS ETOH A... | Raiu, Camelia -Int ... | Jun-19-2
H-4M-416-D | Inp... | CHEST PAIN | Mirfendereski, Sey... | Jun-24-2
H-4M-416-W | Inp... | DILANTIN TOXICITY | Ravakhah, Keyva... | Jun-22-2
H-4M-417-W | Inp... | GI BLEED | Brobbey, Amdrew ... | Jun-18-2

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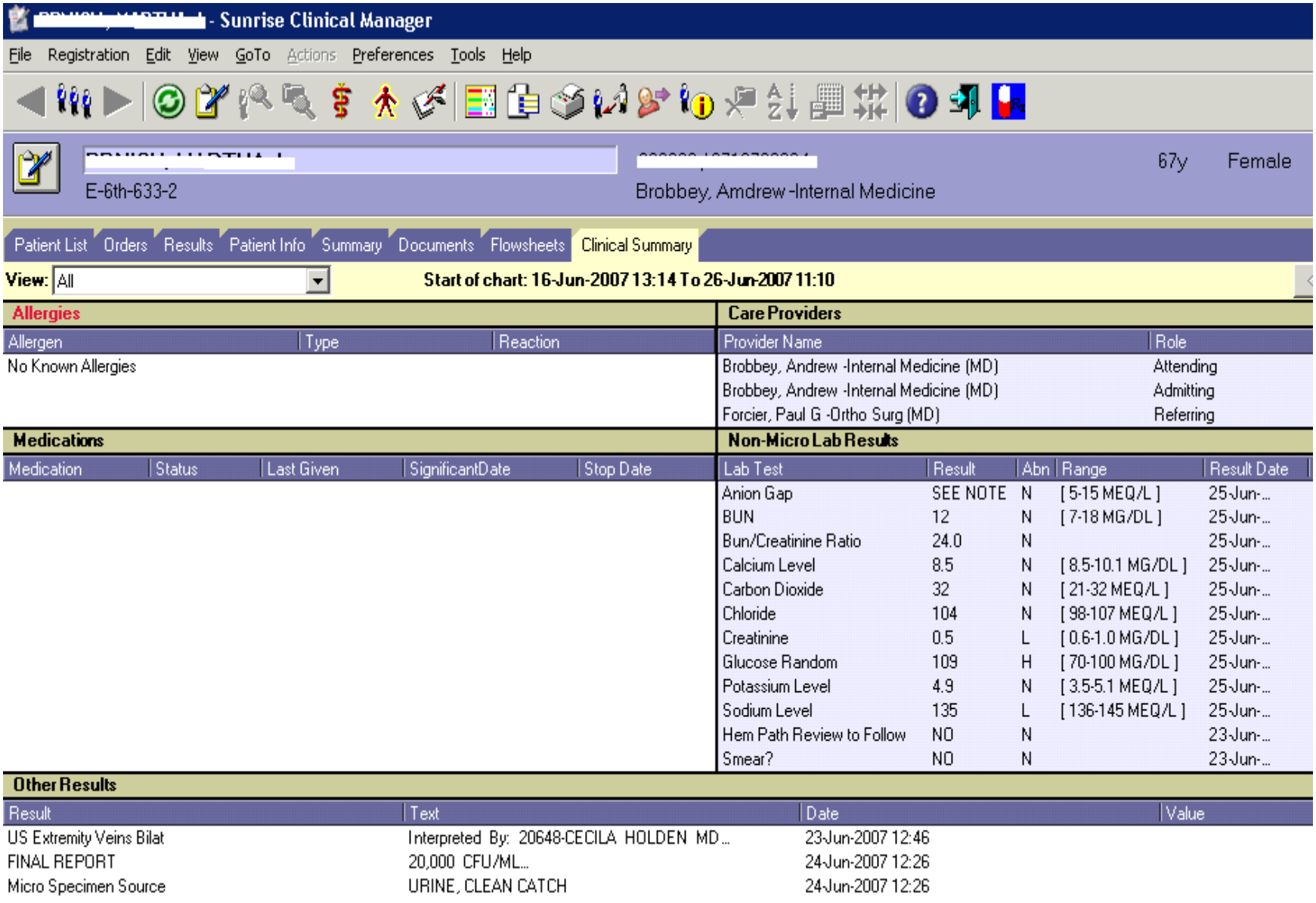
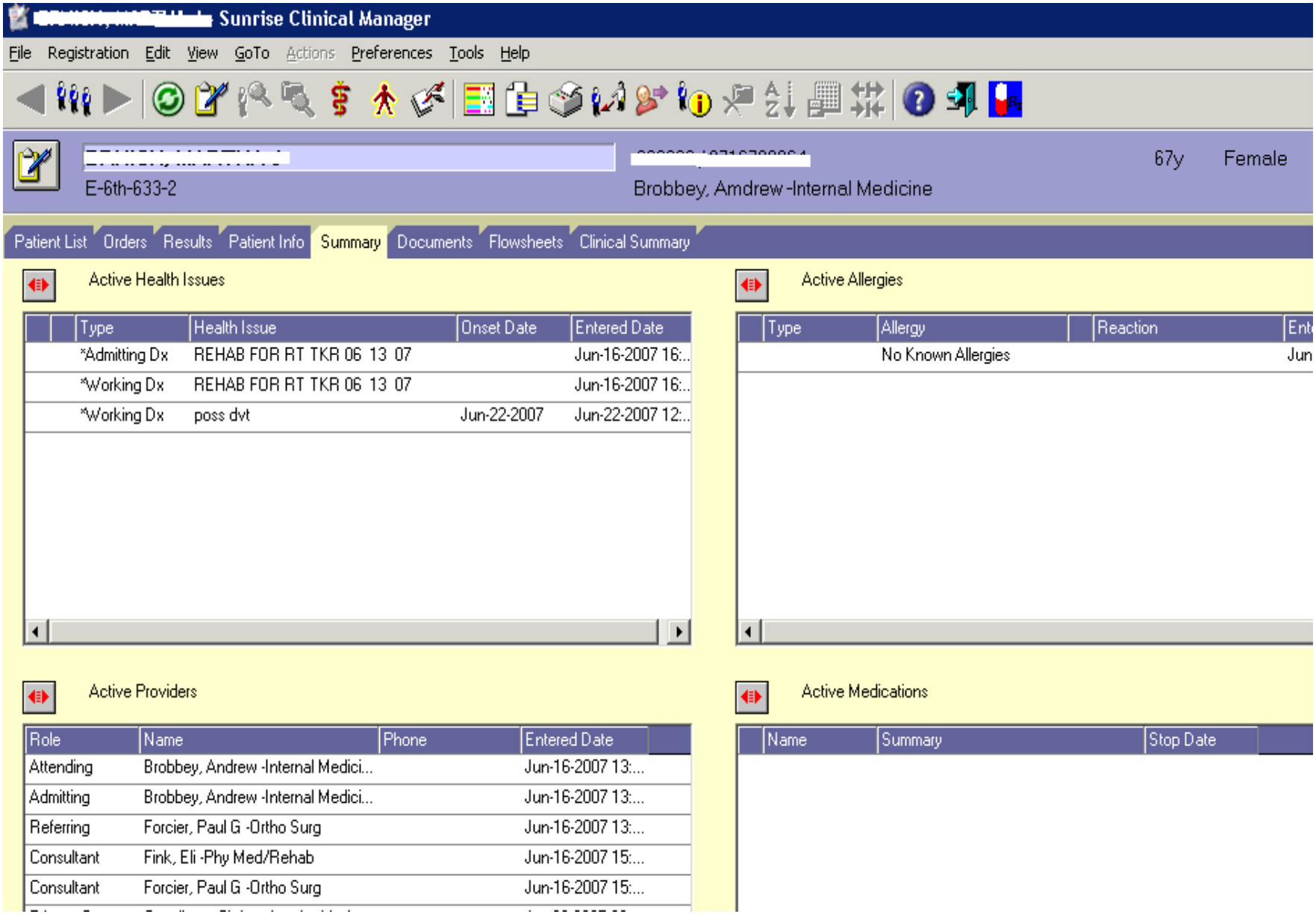

- Sunrise Clinical Manager
File Registration Edit View GoTo Actions Preferences Tools Help
E-6th-633-2
Brobbey, Amdrew -Internal Medicine
67y Female
Patient List Orders Results Patient Info Summary Documents Flowsheets Clinical Summary
View: All
Start of chart: 16-Jun-2007 13:14 To 26-Jun-2007 11:10
Allergies
Allergen Type Reaction
No Known Allergies
Care Providers
Provider Name Role
Brobbey, Andrew -Internal Medicine (MD) Attending
Brobbey, Andrew -Internal Medicine (MD) Admitting
Forcier, Paul G -Ortho Surg (MD) Referring
Medications
Medication Status Last Given SignificantDate Stop Date
Non-Micro Lab Results
Lab Test Result Abn Range Result Date
Anion Gap SEE NOTE N [5-15 MEQ/L] 25-Jun-...
BUN 12 N [7-18 MG/DL] 25-Jun-...
Bun/Creatinine Ratio 24.0 N 25-Jun-...
Calcium Level 8.5 N [8.5-10.1 MG/DL] 25-Jun-...
Carbon Dioxide 32 N [21-32 MEQ/L] 25-Jun-...
Chloride 104 N [98-107 MEQ/L] 25-Jun-...
Creatinine 0.5 L [0.6-1.0 MG/DL] 25-Jun-...
Glucose Random 109 H [70-100 MG/DL] 25-Jun-...
Potassium Level 4.9 N [3.5-5.1 MEQ/L] 25-Jun-...
Sodium Level 135 L [136-145 MEQ/L] 25-Jun-...
Hem Path Review to Follow NO N 23-Jun-...
Smear? NO N 23-Jun-...
Other Results
Result Text Date Value
US Extremity Veins Bilat Interpreted By: 20648-CECILA HOLDEN MD... 23-Jun-2007 12:46
FINAL REPORT 20,000 CFU/ML... 24-Jun-2007 12:26
Micro Specimen Source URINE, CLEAN CATCH 24-Jun-2007 12:26


Sunrise Clinical Manager
File Registration Edit View GoTo Actions Preferences Tools Help
E-6th-633-2
Brobbey, Amdrew -Internal Medicine
67y Female
Patient List Orders Results Patient Info Summary Documents Flowsheets Clinical Summary
Active Health Issues
Type Health Issue Onset Date Entered Date
*Admitting Dx REHAB FOR RT TKR 06 13 07 Jun-16-2007 16:..
*Working Dx REHAB FOR RT TKR 06 13 07 Jun-16-2007 16:..
*Working Dx poss dvt Jun-22-2007 Jun-22-2007 12:..
Active Allergies
Type Allergy Reaction
No Known Allergies
Active Providers
Role Name Phone Entered Date
Attending Brobbey, Andrew -Internal Medici... Jun-16-2007 13:...
Admitting Brobbey, Andrew -Internal Medici... Jun-16-2007 13:...
Referring Forcier, Paul G -Ortho Surg Jun-16-2007 13:...
Consultant Fink, Eli -Phy Med/Rehab Jun-16-2007 15:...
Consultant Forcier, Paul G -Ortho Surg Jun-16-2007 15:...
Active Medications
Name Summary Stop Date

# Unintended Consequences

- Standard Workflows
  - Direct communication decreased at first – reminders that CPOE does not replace the need for verbal communication
  - Large number of alerts firing – reviewed and adjusted with multidisciplinary team input (BMI: anti-anxiety, anti-psychotics and sedatives)
  - FMC – many adjustments for the nursery

# Unintended Consequences

- Order Set Updates
  - Formulary changes hard to incorporate
- Pharmacy Strong Authentication
  - Biometrics
  - FOB's
  - Workflow changed for nursing with four hour sign off

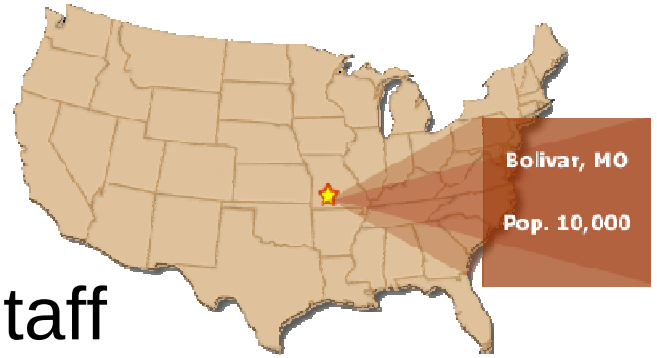
# CPOE…How to Make Lemonade

Denni McColm, Chief Information Officer
Cindi Lockhart, Clinical Application Specialist
Peggy Esch, M.B.A., CPHIMS, HCIS Manager

Citizens Memorial Healthcare

# Our EMR & CPOE Implementation

- One Electronic Medical Record
  - Hospital (74 beds)
  - Long Term Care (6 facilities, 500+ beds)
  - Home Care Services
  - Physician Offices (16 offices)
- CPOE since 2003
- 98 Physicians/Providers on Staff
- Only ½ of Providers using CPOE are employed
- NO Paper Charts in Hospital, LTC, or Clinics
  - all facilities using CPOE

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**Presented by: Denni McColm, Peggy Esch, and Cindi Lockhart, Citizens Memorial Health**



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# Recipe for Success
# Planning is Critical

- The more planning, the less unintended outcomes
- Talk to other sites who have implemented
- Physician input from onset of project
- Phased implementation
- CPOE Committee Meetings
- Plan for difficulty, not impossibility

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# CMH Makes Lemonade

- Problem: Physicians perceived CPOE to be an extra burden (more/new work)

- Solution: Tips, tricks and tools
  - Mini order sets and favorites
  - Evidence based order sets
  - Medication ordering simplification & conventions
  - Compromise on required fields
- Solution: Help physicians make gains in other care areas
  - Access to historical information
  - Remote access to the EMR and CPOE
  - Improved turnaround times for results

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# CMH Makes Lemonade

- Problem: Workflows were altered by CPOE and the transition away from paper (workflow & communication)

- Solution: Identify old workflow and new, paperless workflow
- Solution: Find out where paper is going and who is using it for what purpose - Is it to communicate, inform or drive the next step in the process?
- Solution: Replace necessary paper communication with electronic reports, worklists and processes

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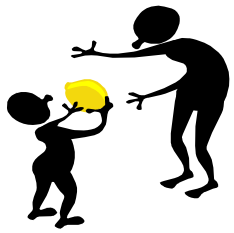
# CMH Makes Lemonade

- Problem: Group trainings and physician-to-physician training did not work (system demands)



- Solution: One-on-one training in increments of no more than 30 minutes
- Solution: Schedule training on their “turf”

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# CMH Makes Lemonade

- Problem: Support never ends (system demands)

- Solution: Allocate ample resources (people) who are
  - Respected by physicians
  - Respectful to physicians
  - Enjoy working with physicians
- Solution: And have them positioned to
  - Keep their “finger on the pulse”
  - Staff a Physician Resource Room or area daily
  - Continue one-on-one trainings for new physicians, for system upgrades, and for new process implementations
  - Provide intense support for new providers

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# CMH Makes Lemonade

- Problem: The physicians did not LOVE CPOE at first sight (Emotions)

- Solution:  Involve physicians in decision to pursue CPOE and planning for implementation
- Solution: Actively solicit physician input – both positive and negative, using multiple avenues
- Solution: Ease into CPOE with phasing
  - Electronic signature/utilization of EMR
  - Computerized order entry for procedures
  - Computerized order entry for medications

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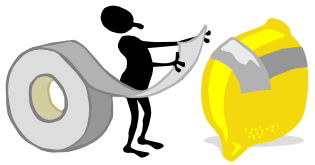
# CMH Makes Lemonade

- Problem: Physicians do not want to be alerted with EVERY possible warning (new kinds of errors, desensitization to alerts)



- Solution: Monitor alerting and responses to alerts
- Solution: Work with physician champions and pharmacy to create meaningful alerting by turning off alerts with no clinical significance

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# CMH Makes Lemonade

- Problem: The system can go down (dependence on the system)

- Solution: “Offline” backup of critical information
- Solution: Forms and procedures during downtime that mimic electronic processes (not old pre-electronic forms)
- Solution: Schedule planned downtime for “practice”
- Solution: Communicate downtime procedures to physicians to gain their confidence in the system

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# Stir it up . . .

- When faced with unintended consequences, face them head-on
- Never say never
- Be innovative
- Be patient
- Make patient safety a priority
- Stay the course

Citizens Memorial Healthcare

**Presented by: Denni McColm, Peggy Esch, and Cindi Lockhart, Citizens Memorial Health**

# How Sweet it is!

- In May 2007, 28,205 orders were entered into our computer system for hospital and ER patients
- 61.6% of all orders entered were entered by physicians
- In our Emergency Department 89.1% of all orders were entered by physicians

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